

(2½ Hours)

[Total Marks: 75]

- N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. **Attempt any three of the following:** 15
- Describe the four major categories used to define Artificial Intelligence.
 - Write a short note on the Rational Agent approach.
 - Discuss any four Foundations of Artificial Intelligence.
 - What is an Agent? Explain the following task environments
 - Static vs. Dynamic.
 - Discrete vs. continuous.
 - What does PEAS stand for? Explain the PEAS components in the task environment of a self-driving taxi.
 - Explain the Model-based Reflex agent with diagram.
2. **Attempt any three of the following:** 15
- Explain the standard formulation of the 8-puzzle problem in Artificial Intelligence.
 - Explain Greedy best-first search.
 - What is Uninformed Search? Explain the Bidirectional Search.
 - Explain the concept of Hill Climbing search algorithm. What are the challenges it encounters?
 - Describe the concept of AND-OR search trees.
 - Write a short note on the mechanism of the Genetic algorithm.
3. **Attempt any three of the following:** 15
- Discuss the Alpha-Beta Pruning method and show its application using an example.
 - Explain the working principle of the minimax algorithm in game-playing.
 - Explain any two state of the art Game Programs.
 - Describe the various logical connectives used in Propositional Logic.
 - Explain the concept of a Knowledge-Based Agent.
 - Explain Bayes Theorem with its formula.

4. Attempt ***any three*** of the following: 15
- a. Explain the concept of Equality in First-Order Logic.
 - b. Describe the two standard quantifiers used in First-Order Logic.
 - c. Write a short note on Forward Chaining.
 - d. Explain Conjunctive Normal Form (CNF) in First-Order Logic.
 - e. Discuss the different types of Artificial Neural Network (ANN).
 - f. Explain the architecture of an Artificial Neural Network (ANN).

5. Attempt ***any three*** of the following: 15
- a. Describe the GRAPHPLAN algorithm.
 - b. Explain the concepts of PDDL and Action.
 - c. Describe the Blocks World planning problem and illustrate it with a diagram.
 - d. Write a short note on Contingent Planning.
 - e. Explain Multiagent Planning.
 - f. Discuss Generative AI.